DOCUMENT RESUME

ED 451 046 SE 064 590

AUTHOR Ducharme, Adele; Dixey, Brenda P.
TITLE Hands-On Minds-On Learning with Electrofiles in Middle Grades.
PUB DATE 2000-11-00
NOTE 12p.; Paper presented at the Annual Meeting of the National Middle School Association (27th, St. Louis, MO, November 2-4, 2000). Some colored figures that may not reproduce well.
PUB TYPE Guides - Classroom - Teacher (052) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Electric Circuits; *Electricity; General Science; *Hands on Science; Middle Schools; *Physical Sciences; Science Activities; Science Education; *Science Instruction; Teaching Methods
IDENTIFIERS *Electrodes

ABSTRACT

Using an interactive method to teach middle school students can address the needs of this diverse population. Electrofiles provide opportunities for students to be actively engaged in learning. Students can build content knowledge in electrical circuits by designing an electrofile or they can review other content area knowledge through a variety of specifically designed file folders. (Author)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 451 046

Hands-On Minds-On Learning With Electrofiles in Middle Grades

Adele Ducharme and Brenda P. Dixey

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

- This document has been reproduced as received from the person or organization originating it.
- Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

A. Ducharme

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

SE 064 590

BEST COPY AVAILABLE

Abstract

Using an interactive method to teach middle school students can address the needs of this diverse population. Electrofiles provide opportunities for students to be actively engaged in learning. Students can build content knowledge in electrical circuits by designing an electrofile or they can review other content area knowledge through a variety of specifically designed file folders.

SEC6450

Hands-on Minds-on Learning with Electrofiles in Middle Grades

"Nothing is so unequal as the equal treatment of unequals" (Wiles & Bondi, 2001, p. 27). This statement is descriptive of today's education for the preadolescent learner. A growing body of knowledge indicates that students' experiences in middle grades influence their success in school and life (Wiles & Bondi, 2001). Therefore, it is essential to use their experiences to address the variety of learning preferences this multifaceted population exhibits on a daily basis. Recognizing the diverse attributes and experiences of these students and addressing their needs through various strategies will help educators recognize "equal treatment" is not desired in the classroom. Interactive hands-on minds-on learning is one method that can be used to meet the diverse needs of middle grade students.

Ruddell (1996) confirms, through a variety of research, "The easiest way to gain and hold students' interest and attention is by engaging them in intellectually rich activities that require problem solving, language interactions, and active participation" (p. 97). This is much easier said than done in many situations. Teachers are now competing with interactive

SCCM4590

games, cellular equipment and other "instant gratification" devices that engage students for brief moments of time, then encourage them to move to the next form of entertainment quite rapidly.

It is the belief of the authors of this paper that most students really do want to learn. They want to be actively engaged in meaningful activities that promote and challenge their problem solving abilities and encourage creativity. They enjoy the interaction among classmates while learning, which according to Vygotsky (1986), is how meaning is derived. Learning does not have to consist of bells and whistles, but must connect with students' experiences, prior knowledge and interests. Students need to know the materials they use will produce the desired result - meaningful learning. It is with that in mind that we decided to use electrofiles in our own teaching as well as encourage K-12 teachers to adapt this concept to their individual classroom situations. Using electrofiles for the purpose of instruction can make reviews of content areas and other skills and knowledge more interesting to students.

Active Learning

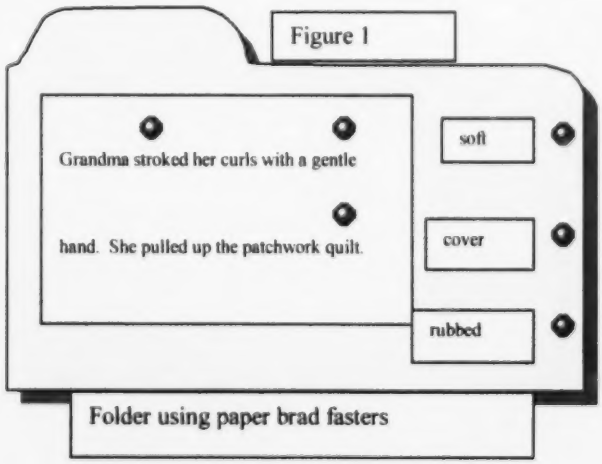
Teaching for active learning and transfer of knowledge using hands-on minds-on learning can be accomplished with

electrofiles. It is a tactile tool used to reinforce or enhance skills and content knowledge. The electrofile is an adaptation of electroboard (Carbo, Dunn & Dunn, 1986). The electrofile is composed of two parts, the clipboard lighting system and the file folder that contains the exercise. See Figures 1, 2,and 4. Through this method, middle grades students become actively engaged in reviewing, verifying, or challenging themselves and others in skills and concepts. At the same time the science concept of circuitry can be introduced, reviewed, or expanded while using electrofiles.

Materials needed are clipboard, 9 volt battery, 9 volt battery connector, jumper leads with alligator clips, small 12 volt light bulb, electrical tape, glue, scissors, hole punch, brass paper brads, colored file folder, aluminum foil, paper reinforcements (optional), paper cutter, and wide packing tape.

File folder

1. Begin with a colored file folder (use color folder so student can not see through it).



2. Questions and responses should be typed. Cut questions apart and then place one- inch from the left edge of the folder. Place the answers onto the right side of the electrofile one-inch from the edge. Remember to mix up the order of the answers. You may choose to construct the entire design for a page, print it and glue the paper to the file folder. Be sure when designing your page to leave enough space between items and margins from edge so holes may be punched and circuits may be completed.

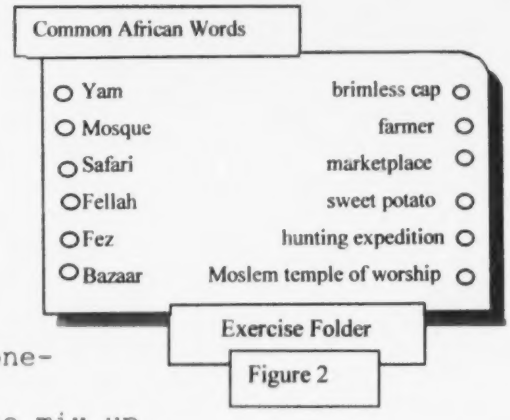
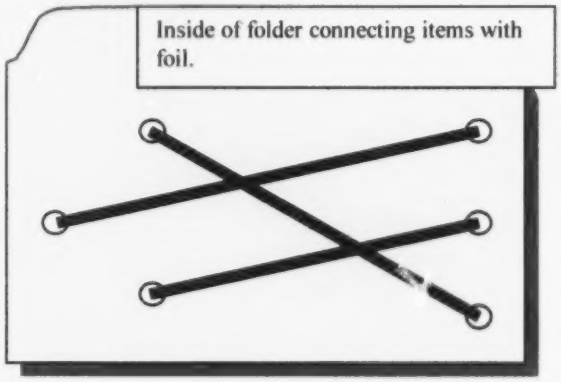


Figure 2

3. Laminate the file folder.

4. Open up the folder and use a hole punch to make one hole in front of each question/answer on the outer edge of folder. See Figure 2. Holes that are on the right side should be on the outer edge with answers on the inside of the holes otherwise it is difficult to see the questions and answers. If brass paper brads are used, pierce the laminated surface on the playing surface with the points of the brass paper brads. It is best to use brass paper brads when items are in the center of the folder.

5. Turn the folder over and on its back to create circuits made with aluminum foil strips and masking tape or packing tape. Lay strips of aluminum foil (1/2" X 12") connecting each question and its correct answer. Next, use packing tape that is wider than the foil strips to cover each so they completely cover the punched holes and remain permanently fixed. Be sure that each circuit is complete and insulated with the tape before doing the next question/answer circuit. If your design requires triangulation (connecting three items) of questions and answers you may use brass paper brads instead of punching holes. If brass paper brads are used, pierce one end of the aluminum strip onto the brad point for the question and spread the brad points to hold the strip in place. Do the same for the answer. Then apply a strip of tape so that it completely covers both the foil strip and the spread flattened brad points.

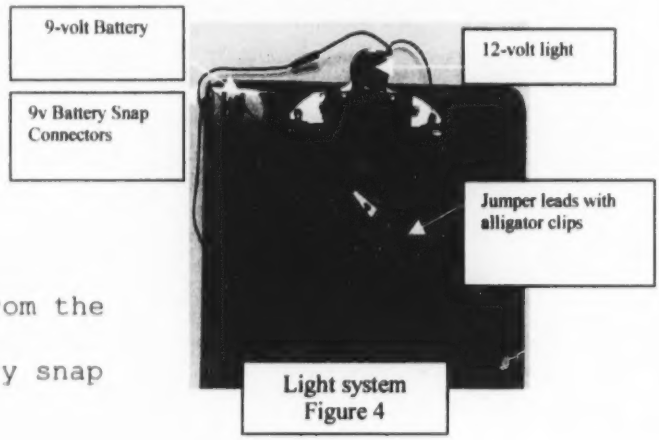


6. Check every circuit using the clipboard system to be certain that each is working.

7. Close the folder and tape the sides shut with packing tape so that students may not open up the folder to determine the answers.

Clipboard System

1. Place the light bulb in the hole of the clipboard handle. The bulbs come in several colors, red, green, blue, and yellow.



Light system
Figure 4

2. Attach one wire lead from the bulb to the 9-volt battery snap cap connector.

3. Cut the 24 inch jumper lead wire in half.

4. Strip insulation from ends of cut ends of jumper lead wires.

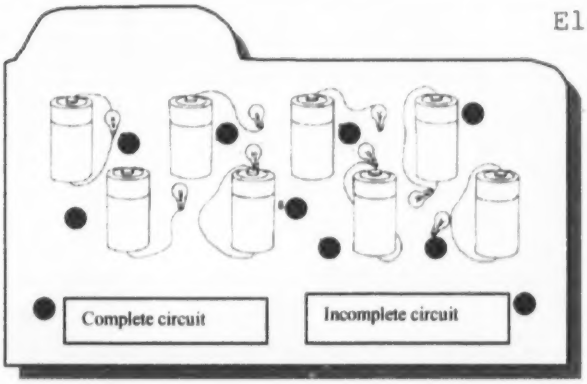
5. Next attach the second wire from the bulb to the jumper wire.

6. Attach the second wire coming from the battery snap cap connector to the second jumper lead wire.

7. Wrap electrical tape around the connections where the wires are attached.

8. Connect the battery snap cap connector to the 9-volt battery and glue the battery to the clipboard with the snap cap connector facing the outer edge of the clipboard.

Using Electrofile to Introduce Circuits



Electrofiles can be used very effectively in the study of circuits. Have students use the electrofile to determine their level of knowledge about complete circuits. From the pre-assessment the teacher will determine the starting point of the unit of study. The electrofile may be used at any point in the unit to ascertain if students understand the concepts taught. Have students make their own electrofiles concerning concepts learned in the unit to challenge their peers. Also use electrofiles to review vocabulary for the unit such as electrons, negatively charged, positively charged, electricity, circuit, conductors, insulators, series circuits, and parallel circuit.

Make and use electrofiles with any content area or concept. Make several electrofiles and bring active

learning into your middle grades classroom. Electrofiles will energize students' desire to learn.

References

Carbo, M., Dunn, R., & Dunn, K. (1986). Teaching students to read through their individual learning styles. Englewood Cliffs, NJ: Prentice-Hall.

Harold, E. (1993). Integrating literature series: Science. Torrance, CA: Frank Schaffer.

Ruddell, M.R. (1996). Engaging students' interest and willing participation in subject area learning. In D. Lapp, J. Flood, & N. Farnan (Eds.), Content area reading and learning instructional strategies (pp. 95-110). Boston: Allyn and Bacon.

Viviano, C. L. (1997). Grandma's quilt. New Orleans: Tree House Press.

Wiles, J., & Bondi, J. (2001). The new American middle school. Columbus, OH: Merrill Prentice Hall.